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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/101,508	09/30/1998	JEAN-LOUIS BOYER	100983	9727

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EXAMINER

CHAMBERS, TROY

ART UNIT PAPER NUMBER

3641

DATE MAILED: 10/10/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/101,508

Applicant(s)

BOYER ET AL.

Examiner

Troy Chambers

Art Unit

3641

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 14-31 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 14-31 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 14, 15, 16, 17, 19, 27, 28, 30 and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5476044 issued to Boucher. Boucher discloses an electronic safe/arm device 10.

The **internal low-voltage periodic power source 12** is operably connected to, and discharged through, the primary winding of a transformer 14, which comprises at least one secondary winding to step-up the low-voltage power of power source 12 to a voltage adequate to power the remainder of the circuit. **An arming circuit 16 derives and stores high-voltage power from the output of transformer 14.** Arming circuit 16 is operably connected to detonator 18 so that the high-voltage power stored in arming circuit 16 can be discharged through detonator 18 to fire the detonator, which is placed in close proximity to the explosive charge and in turn detonates the explosive charge. Such discharge is controlled by a firing circuit 20, which, as shown, derives its power from the output of transformer 14, as does arming circuit 16.

One embodiment of a safe/arm firing circuit generally described in connection with FIG. 1 can be understood with reference to FIG. 2. The low-voltage periodic power source 12 comprises a **low-voltage internal battery 120, which preferably provides**

Art Unit: 3641

an output of about 3 volts. Internal battery 120 is operably connected to the primary winding 140 of isolation transformer 14 by an optional arm-enable switch 122 and an optional power-enable switch 124. When arm-enable switch 122 and power-enable switch 124 are closed, battery 120 can be discharged through primary winding 140 by closing a dynamic switch 126 that is operated by dynamic switch control 128. The periodic opening and closing of dynamic switch 126 yields periodic low-voltage power pulses from battery 120 to primary winding 140 of transformer 14. The arm-enable switch 122 closes upon receipt of an arm command, and power-enable switch 124 is closed by controller 130 in response to an enable command. **Arm-enable switch 122 and controller 130 are high-voltage components, so the arm command and the enable command must be high-voltage signals, which cannot be obtained directly from battery 120.** Therefore, these signals must be obtained from an external source or, as discussed below, from the output of transformer 14.

Transformer 14 comprises a secondary winding 142 that steps-up the voltage from primary winding 140, for example, to about 45 to 65 volts, to provide power to arming circuit 16. Arming circuit 16 comprises a rectifier 160 connected to secondary winding 142 to provide a high-voltage, direct current output signal from transformer 14. The output of rectifier 160 charges **a firing capacitor 162** that stores the high-voltage energy derived from the output of transformer 14.

Transformer 14 comprises another secondary winding 144 to step-up the voltage from primary winding 140, for example, to about 12 volts. A second rectifier 164 in arming circuit 16 is connected to secondary winding 144 and to the optional, normally open

Art Unit: 3641

shunt relay 166, which closes in response to a signal from rectifier 164. Rectifier 164 is also operably connected to arm-enable switch 122 and controller 130 for power-enable switch 124 to provide internally generated high-voltage enable and arm command signals to these components in place of the external sources of these signals.

Detonator 18 is operably connected to arming circuit 16 through shunt relay 166, which is normally open and which closes upon receiving an output signal from transformer 14 via rectifier 164. Detonator 18 comprises an explosive bridgewire 180 or the like, and may be grounded through a fire switch 210 in firing circuit 20 so that high-voltage energy stored in the arming circuit can be discharged through detonator 18 to fire the detonator and thus detonate the explosive charge. **Detonator 18 is a high-voltage detonator for which power source 12 has insufficient voltage to fire on its own.**

Firing circuit 20 comprises **a timer 212 or the like** that derives power from the output of transformer 14, e.g., from the high-voltage arm command signal generated by rectifier 164. Timer 212 closes fire switch 210 after an appropriate interval following a predetermined event such as the initial receipt of an arm signal or the actuation of a pressure switch. Should transformer 14 cease to produce high-voltage output, the firing circuit will not be able to close fire switch 210 to fire the device.

Initially, the safe/arm circuit shown in FIG. 2 is in a safe dormant mode in which the internal power source 12 is disconnected from the transformer because arm-enable switch 122 and power-enable switch 124 are open. In addition, power source 12 is inoperable because dynamic switch 126 is open. Arming circuit 16 is uncharged, and

detonator 18 is disconnected from the arming circuit because shunt relay 166 is open.

Detonator 18 is also disconnected from the ground because fire switch 210 is open; so even if arming circuit 16 were charged it could not fire the device.

Several safety features of the safe/arm device of the present invention are indicated in FIG. 2. For example, battery 120, being a low-voltage battery, is of insufficient voltage to fire bridgewire 180, or to sufficiently charge firing capacitor 162 in the event of a short circuit. Further, there are three (3) switches which must operate in response to external signal before the voltage of internal battery 120 can be stepped-up through transformer 14; these are arm-enable switch 122, power-enable switch 124, and dynamic switch 126. These three switches will only operate in response to high-voltage signals that cannot be obtained from battery 120 until the device receives two high-voltage start-up signals from an external source, i.e., an enable command and an arm command. Furthermore, the continued operation of the circuit requires the maintenance of these commands, which, after the external sources are removed, can only be provided from the output of transformer 14, as discussed above with respect to the output of rectifier 164. Accordingly, if the circuit is damaged, rectifier 164 may stop providing the arm and enable commands necessary for the operation of low-voltage power source 12. The absence of an arm command will force dynamic switch control 128 to leave dynamic switch 126 open, and will also open switches 122 and 124. Thus, the high-voltage output of transformer 14 will cease. In such case, even if firing capacitor 162 has a sufficient charge to inadvertently fire detonator 18, the charge will quickly be dissipated through **bleeder resistor 168**, leaving the circuit inoperable.

Art Unit: 3641

Moreover, the absence of output from rectifier 164 will cause shunt relay 166 to open, disconnecting detonator 18 from arming circuit 16. Thus, the device may be rendered inoperative even before the arming circuit is depleted. Finally, even if the foregoing safety features do not function properly, the firing circuit 20, which must operate in order to discharge firing capacitor 162 through detonator 18, will cease to function in the absence of output from transformer 14 through rectifier 164.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 17, 19 and 22-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boucher in view of U.S. Patent No. 4632031 issued to Jarrott et al. (hereinafter "Jarrott"). Boucher discloses an electronic safe/arm device 10 as described above. However, Boucher does not disclose the subject matter of applicant's claims 17, 19 and 22-26.

Jarrott discloses such subject matter. Specifically, Jarrott discloses a programmable electronic delay fuse comprising: a power source 33; a programmable timer 2 including a first delay timer A and a second delay timer B; an optical interface unit 1 for transmission of delay-related clock signals to an external programming unit; a control processor 31; a display 32; and a keyboard 30.

Art Unit: 3641

At the time of the invention, one of ordinary skill in the art would have found it obvious to provide the safe/arm device of Boucher with the programming capabilities disclosed by Jarrott. The suggestion/motivation for doing so would have been to provide the user/operator with control and observation of the device function (Jarrott, col. 1, ll. 48-50). Or, using Jarrott as the primary reference, one of ordinary skill in the art would have found it obvious to provide the programming system of Jarrott with the firing circuit of Boucher. The suggestion/motivation for doing so in this particular scenario would have been to safely power the firing circuitry that controls the firing of an explosive device (col. 1, ll. 16-18).

4. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Boucher. Boucher discloses an electronic arm/safe device as described above. However, Boucher does not disclose explicitly the subject matter of applicant's claims 18, 20-26, 28 and 29.

With respect to claim 18, the use of a transistor as a switching means is well known in the art and the use of such a device is well within the knowledge of one with ordinary skill in the art. (See, e.g. U.S. Patent No. 5440991 col. 3, ll. 17-32).

5. Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boucher in view of Caruso. Boucher discloses a safe/arm device as described above. But, Boucher does not disclose a code wheel as claimed by the applicant. Caruso discloses an electromechanical decoder comprising a code wheel. At the time of the invention one of ordinary skill in the art would have found it obvious to provide the

Art Unit: 3641

safe/arm device of Boucher with the decoder device of Caruso. The suggestion/motivation for doing so would have been to provide a device in which a preset code must be applied to the safe/arm device in order for it to perform its detonation operation. The suggestion/motivation for providing a luminescent code wheel would have been to provide for nighttime operations.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The patents listed on the enclosed form PTO-892 are cited as of interest to show similar priming devices.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Troy Chambers whose telephone number is (703) 308-5870. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael J. Carone, can be reached at (703) 306-4198.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-4177. The fax phone number for the organization where this application or proceeding is assigned is (703) 306-7687.


MICHAEL J. CARONE
SUPERVISORY PATENT EXAMINER